

REMARKS

Reconsideration of the application is requested.

Claims 21-29, 31, 34 and 36-40 are now in the application.

Claims 21, 22, 29 and 34 have been amended. Claim 40 has been added. Claims 30, 32, 33 and 35 have been canceled.

Under the heading "Claim Rejections - 35 USC § 103" on pages 2-6 of the above-identified Office Action, claims 21-29 have been rejected as being obvious over U.S. Patent No. 6,498,418 to Rueger (hereinafter Rueger) in view of U.S. Patent No. 5,173,832 to Giorgetta et al. (hereinafter Giorgetta) under 35 U.S.C. § 103.

Rueger describes a method for controlling an actuator, in which an error current measurement occurs in the actuator circuit in order to generate a diagnostic signal. More specifically, the current is measured at resistor 300 and the measured value is used for controlling a charging or discharging of the piezoelectric element 10-60 by opening and closing related switches 220 or 230 (see column 6, lines 50-63). For detecting a short circuit to chassis ground, Rueger monitors currents at different locations in the drive circuitry. During a charging phase with switch 220 closed and during a discharging phase with switch 230 open, current should be flowing through both the shunt resistor 651 and the

piezoelectric resistor 300. However, if a short circuit occurs from the piezoelectric element to ground no current will be present across resistor 300. The currents are respectively measured at nodes 650 and 620. The measuring currents are compared with each other and a signal representing the difference is generated by logic circuit 800. The known currents should be roughly equal during proper operation (e.g. no short circuit to ground). A similar comparison is done during a discharge cycle (see column 12, line 39 to column 13, line 24). In this manner a short circuit to ground can be diagnosed. In addition, Rueger teaches measuring a voltage at the node 640 of a voltage divider for measuring the available input voltage from battery 200 and voltage converter 201. However, this measurement merely assures that the voltage converter/battery are functioning properly.

In Rueger, no distinction is made between a short circuit to ground and a short circuit to a voltage supply or an open load condition. In addition, no measurement of a shorted actuator is taught nor does Rueger teach the detection of a short circuit on the negative terminal of the actuator.

The Examiner relies on Giorgetta to teach using a voltage measurement for diagnostic purposes. In Giorgetta, a diagnostic module 9A (see Fig. 1) measures the voltage at an

actuator (load) A via a line 10A and the current through the actuator (load) A via a line 8A. In order to detect errors in the actuator circuit for the actuator A, a current measurement as well as a voltage measurement occurs.

Giorgetta teaches three distinct fault conditions and they include:

- a) a short circuit between a first terminal of the actuator and a positive pole of the battery;
- b) a short circuit between the first terminal of the actuator and ground; and
- c) an open load condition.

For detecting a short circuit to the between the first terminal of the actuator and the positive pole of the battery, a voltage test is conducted by comparators 13A and 14A to determine if the voltage is in the range of the battery voltage.

In the short circuit condition between the first terminal of the actuator and ground, the current through line 8A falls and thus so does the voltage and its falls below a given voltage threshold for comparator 15A.

An open load condition is also detected by comparator 15A due to the canceling out of the current in the load.

However, neither Rueger nor Giorgetta teaches integrating the first current over a given period of time resulting in a charge value which is used for determining a short circuit across the actuator itself as recited in amended claim 21 of the instant application. The charge value Q1 can be used for determining a short in the actuator itself or to distinguish between a short circuit on the positive terminal of the actuator and a negative terminal of the actuator as recited in newly added claim 40. Support for the changes to claim 21 and newly added claim 40 is found on page 13, lines 9-18, page 16, lines 4-13 and as shown in the flow chart in Fig. 2A of the specification of the instant application. As neither Rueger nor Giorgetta are believed to teach these features claim 21 and newly added claim 40 are believed to be allowable.

Claim 29 has been amended with the allowable features of claim 35 and intervening claim 30. The remaining claims were amended as to be compatible with amended claims 21 and 29 or to address informalities noted while reviewing the claims.

Under the heading "Claim Rejections - 35 USC § 103" on pages 6-8 of the above-identified Office Action, claims 30, 31, 33

and 39 have been rejected as being obvious over U.S. Patent No. 6,498,418 to Rueger (hereinafter Rueger) in view of U.S. Patent No. 5,173,832 to Giorgetta et al. (hereinafter Giorgetta) and further in view of U.S. Japanese patent disclosure JP 2002101673 to Fukagawa et al. (hereinafter Fukagawa) under 35 U.S.C. § 103.

Claim 29 has been amended with the allowable features of claims 30 and 35. As claims 30, 31, 33 and 39 have been canceled or ultimately depend on claim 29, the rejection is now believed to be moot.

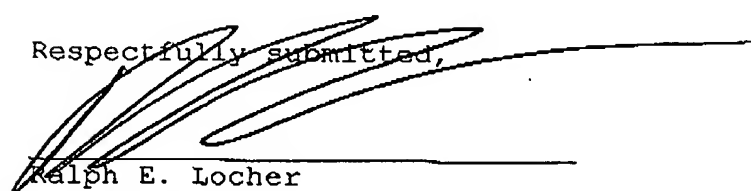
It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claims 21 and 29. Claims 21 and 29 are, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claims 21 and 29.

In view of the foregoing, reconsideration and allowance of claims 21-29, 31, 34 and 36-40 are solicited.

If an extension of time is required, petition for extension is herewith made. Any extension fee associated therewith should be charged to the Deposit Account of Lerner Greenberg Stemmer LLP, No. 12-1099.

Please charge any other fees that might be due with respect to
Sections 1.16 and 1.17 to the Deposit Account of Lerner
Greenberg Sterner LLP, No. 12-1099.

Respectfully Submitted,



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